

CLAIMS:

1. A halftone phase shift mask blank comprising a transparent substrate and a phase shifter film thereon, the phase shifter film being composed of a metal silicide compound containing molybdenum, at least one metal selected from the group consisting of tantalum, zirconium, chromium, and tungsten, and at least one element selected from the group consisting of oxygen, nitrogen, and carbon.

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2. The halftone phase shift mask blank of claim 1 wherein said metal silicide compound is a silicide oxide, silicide nitride, silicide oxynitride, silicide oxycarbide, silicide nitride carbide or silicide oxide nitride carbide containing molybdenum and at least one metal selected from the group consisting of tantalum, zirconium, chromium, and tungsten.

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3. A method of manufacturing a halftone phase shift mask blank, comprising the steps of:

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using molybdenum silicide as a first target and at least one metal silicide selected from the group consisting of tantalum silicide, zirconium silicide, chromium silicide, and tungsten silicide as a second target, and

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carrying out reactive sputtering in the presence of at least one reactive gas containing at least one element selected from the group consisting of oxygen, nitrogen, and carbon, while applying an electric power to the first and second targets at the same time, thereby forming a phase shifter film of a metal silicide compound on a transparent substrate.

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4. The method of claim 3 wherein in the sputtering step, the surfaces of the first and second targets facing the transparent substrate are inclined at an angle of 30 to 60 degrees to the surface of the transparent substrate on which the phase shifter film is to be formed, and the transparent substrate is rotated about its axis.

5. The method of claim 3 wherein the molybdenum silicide as the first target has a molar ratio of silicon to molybdenum of up to 4, and the metal silicide as the second target has a molar ratio of silicon to metal of at least 18.

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6. The method of claim 3 wherein said metal silicide compound is a silicide oxide, silicide nitride, silicide oxynitride, silicide oxycarbide, silicide nitride carbide or silicide oxide nitride carbide containing molybdenum and at 10 least one metal selected from the group consisting of tantalum, zirconium, chromium, and tungsten.

7. The method of claim 3 wherein a DC, pulse DC or RF power supply is used to apply an electric power to the 15 targets.